

Scientific Inquiry

PS-1 The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions.

PS-1.7 Evaluate a technological design or product on the basis of designated criteria (including cost, time, and materials).

Taxonomy Level: 5.1-B Evaluate Conceptual Knowledge

Key Concepts:

Technological design or product

Criteria: cost, time, materials

Previous/Future knowledge: In the 5th grade (5-1.7), students used a simple technological design process to develop a solution or product. In the 6th grade (6-1.4), students planned and produced a solution or product using a technological design process which included identifying a problem, designing a solution or product, implementing the design, and evaluating the solution or product. Technological design will continue to be developed at a higher level in biology, chemistry, and physics.

It is essential for student to

- Understand that technological designs or products are produced by the application of scientific knowledge to meet specific needs of humans. The field of engineering focuses on these processes.
- Understand that there are four stages of technological design:
 - Problem identification
 - Solution design (a process or a product)
 - Implementation
 - Evaluation
- Understand that common requirements within the solution design stage of all technological designs or products include:
 - Cost effectiveness or lowest cost for production;
 - Time effectiveness or the least amount of time required for production, and
 - Materials that meet specific criteria, such as:
 - Solves the problem
 - Reasonably priced
 - Availability
 - Durability
 - Not harmful to users or to the environment
 - Qualities matching requirements for product or solution
 - Manufacturing process matches characteristics of the material
- Understand that benefits need to exceed the risk.
- Understand that there are tradeoffs among the various criteria. For example, the best material for a specific purpose may be too expensive.

It is not essential for students to

- Recognize which field of engineering is involved with specific products or designs.
- Match specific materials that would be best for specific technological designs or products without being given characteristics of the given materials.

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Assessment Guidelines:

The objective of this indicator is to evaluate a technological design or product on the basis of designated criteria, therefore, the primary focus of the assessment should be to critique a technological design or product to determine if it meets designated criteria.

In addition to *evaluate*, assessments may require students to:

- Exemplify the best product based on given criteria;
- Analyze the best product or design from a given set based on associated criteria.
- Compare given products or designs on the basis of given criteria to select the best.
- Summarize the qualities of the best product or design based on given criteria.
- Infer from given criteria and qualities which product or design matches best.